UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/084,497	02/28/2002	Luigi Tallone	4481-046	7482

7590 06/29/2004

Paul D. Greeley
c/o Ohlandt, Greeley, Ruggiero & Perle
Suite 903
One Landmark Square
Stamford, CT 06901

EXAMINER	
SUCHECKI, KRYSTYNA	
ART UNIT	PAPER NUMBER
2882	

DATE MAILED: 06/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/084,497	TALLONE, LUIGI	
	Examin r	Art Unit	
	Krystyna Suchecki	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the corr spond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-22 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 28 February 2002 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 11-16 and 19-22 are rejected under 35 U.S.C. 102(e) as being anticipated by Saito (US 6,226,428).

3. Regarding Claim 1, Figure 16 of Saito teaches an optical multiplexer/demultiplexer, including: an integrated optics substrate (10) defining main propagation path (uppermost left path) for optical radiation, said main propagation path having an aggregate port transmitting an aggregate optical radiation including plurality of wavelengths, plurality selective optical couplers (51, 52, 53) distributed along said main propagation path, each said selective optical coupler being arranged for adding to (rightmost lower Lambdas) and removing (leftmost upper Lambdas) from said aggregate optical radiation respective tributary optical radiation centered around respective tributary wavelength, and a plurality of tributary propagation paths for optical radiation provided said integrated optics substrate, each of said tributary paths extending between a respective one of said selective optical couplers and a respective tributary port transmitting said tributary optical radiation centered around said respective tributary wavelength.

4. Regarding Claim 11, Saito teaches the multiplexer/demultiplexer of claim 1, wherein said selective optical couplers are arranged to obtain 100% energy transfer of optical radiation propagating along said main propagation path (Column 3, lines 1-4).

5. Regarding Claim 12, Saito teaches the multiplexer/demultiplexer of claim 1, wherein said selective optical couplers have associated therewith respective optical filters each arranged to filter out of said optical radiation propagating along said main propagation path a respective optical radiation centered around a respective filter wavelength (Column 3, lines 1-19 and Figure 16).

6. Regarding Claim 13, Saito teaches a multiplexer/demultiplexer wherein said filters are in the form of Bragg gratings (55-58) each reflecting radiation at a respective filter wavelength (Column 6, lines 4-10 and Column 7, lines 37-45).

7. Regarding claim 14, Saito teaches a multiplexer/demultiplexer wherein said Bragg gratings have a reflectivity of at least 35 dB (This shown since in-coupled, or reflected, wavelengths are "completely coupled" according to Column 3, lines 1-28).

8. Regarding Claim 15, the method of forming a device is not germane to the issue of patentability of the device itself. Therefore, this limitation has not been given patentable weight and Saito therefore teaches a multiplexer/demultiplexer wherein said Bragg gratings are photoinduced in said integrated optics substrate.

9. Regarding Claim 16, Saito teaches an optical multiplexer/demultiplexer (Column 3, lines 27-28 and Figure 16), including an integrated optics substrate (item 51 and Column 7, lines 59-63) including optical waveguides defining a main propagation path for optical radiation, said main propagation path having an aggregate port (uppermost left) for transmitting an aggregate

optical radiation including a plurality of wavelengths (Lambdas 1-5), a plurality of selective optical couplers (51-58), said optical couplers being formed by said optical waveguides and distributed along said main propagation path, each said selective optical coupler being arranged for adding to and removing from said aggregate optical radiation a respective tributary optical radiation centered around a respective tributary wavelength, and a plurality of tributary propagation paths (uppermost right and lowermost left) for optical radiation provided in said integrated optics substrate, each of said tributary paths extending between a respective one of said selective optical couplers and a respective tributary port for transmitting said tributary optical radiation centered around said respective tributary wavelength.

10. Regarding Claim 19, Saito teaches an optical multiplexer/demultiplexer, including:

a. an integrated optics substrate defining a main propagation path for optical radiation, said main propagation path an aggregate port (uppermost left) for transmitting an aggregate optical radiation including a plurality of wavelengths,

b. a plurality of selective optical couplers (51-54) distributed along said main propagation path, each said selective optical coupler being arranged for adding to and removing from said aggregate optical radiation a respective tributary optical radiation centered around a respective tributary wavelength, and

c. a plurality of tributary propagation paths (uppermost right and lowermost left) for optical radiation provided in said integrated optics substrate, each of said tributary paths extending between a respective one of said selective optical couplers and a respective tributary port for transmitting said tributary optical radiation centered around said respective tributary wavelength,

d. wherein said main propagation path of said integrated optics substrate includes at least two cusps (Bragg gratings within 55 and 58) with at least two respective reflecting elements (gratings) located at said two cusps; at least one of said selective optical couplers (52) being arranged between said at least two respective reflecting elements.

11. Regarding claim 20, Saito teaches the optical multiplexer/demultiplexer of claim 19, wherein said integrated optics substrate includes optical waveguides defining said main propagation path for optical radiation, and wherein said optical couplers are formed by said optical waveguides (Figure 16).

12. Regarding claim 21, Saito teaches an optical multiplexer/demultiplexer, including:

e. an integrated optics substrate defining a main propagation path for optical radiation, said main propagation path having an aggregate port (uppermost left) for transmitting an aggregate optical radiation including a plurality of wavelengths,

f. a plurality of selective optical couplers (51-54) distributed along said main propagation path, each said selective optical coupler being arranged for adding to and removing from said aggregate optical radiation a respective tributary optical radiation centered around a respective tributary wavelength, and

g. a plurality of tributary propagation paths (uppermost right and lowermost left) for optical radiation provided in said integrated optics substrate, each of said tributary paths extending between a respective one of said selective optical couplers and a respective tributary port for transmitting said tributary optical radiation centered around said respective tributary wavelength,

h. wherein said selective optical couplers have associated therewith respective optical filters (55-58) each arranged to filter out of said optical radiation propagating along said main propagation path a respective optical radiation centered around a respective filter wavelength, said filters being in the form of Bragg gratings each reflecting radiation at a respective filter wavelength.

13. Regarding claim 22, Saito teaches the optical multiplexer/demultiplexer of claim 21, wherein said integrated optics substrate includes optical waveguides defining said main propagation path for optical radiation, and wherein said optical couplers are formed by said optical waveguides (Figure 16).

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

15. Claims 2-8, 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito in view of Seino (US 6,243,516).

16. Regarding Claims 2-8, Saito teaches an optical multiplexer/demultiplexer for claim 1 above, and also teaches a rectangular chip (Column 7, line 61) having at least one zig and one zag including at least one cusp (55), at least one reflecting element being arranged at said at least one cusp to produce propagation of optical radiation along the at least one zig and one zag in Figure 16. Saito also teaches an optical coupler arranged to obtain a 50% optical energy coupling (Column 3, lines 1-4).

17. Saito fails to teach more than one zig and more than one zag cooperating to make a repeating zig-zag pattern, the zig-zag pattern haiving at least one reflecting element including a reflecting metallization associated with an integrated optics substrate, the reflecting element having associated therewith a respective optical coupler, the reflecting element including a reflective surface at the end surface of a respective optical coupler. Saito also fails to teach a main propagation path in an integrated optics substrate including at least two cusps with at least two respective reflecting elements located at the said two cusps, at least one of the selective optical couplers being arranged between the at least two reflecting elements. Saito also fails to teach specifically that the integrated optics substrate is of a material selected out of the group consisting of silicon on silica and silica.

18. Seino teaches a means for shortening conventional waveguide devices (Column 13, lines 13-23) by having a folded waveguide structure (Figures 19, 20 and 27) on a silicon substrate (Column 13, line 36 and Column 14, line 14) such that metallized (Column 12, lines 45-55) reflectors (16) are positioned on opposing sides of an integrated optics strip (7). The reflectors thereby make reflecting cusps for a zig-zag patterned optical device. Devices such as optical filters (14) for wavelength-multiplex communications (Column 1, line 30) can then be arranged in a zig-zag pattern to take up less space (Column 1, lines 46-50).

19. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a multiplexer/demultiplexer wherein a main propagation path extends in a zig-zag pattern including a cusp, at least one reflecting element being arranged at said at least one cusp to produce propagation of optical radiation along said zig-zag propagation pattern, the at least one reflecting element including a reflecting metallization associated with

said integrated optics substrate, wherein said least one reflecting element has associated therewith a respective optical coupler, the optical coupler arranged for 50% optical energy coupling. The multiplexer/demultiplexer would have a reflecting element including a reflective surface at the end surface of the respective optical coupler, and the main propagation path of said integrated optics substrate could include at least two cusps with at least two respective reflecting elements located at the said two cusps; at least one of said selective optical couplers being arranged between said at least two respective reflecting elements, said integrated optics substrate being in a form having opposed side surfaces wherein at least two reflecting elements are arranged at opposed surfaces of said integrated optics substrate. The multiplexer/demultiplexer integrated optics substrate can be in the form of rectangular chip with a material selected out of the group consisting of silica silicon and silica. The optical coupler and filter of Saito would thereby benefit from space saving (Seino, Column 1, lines 46-50) and device shortening (Seino, Column 13, lines 13-23) improvements.

20. Regarding Claim 17, Figure 16 of Saito teaches an optical multiplexer/demultiplexer, including:

i. an integrated optics substrate defining a main propagation path for optical radiation, said main propagation path having an aggregate port (uppermost left) for transmitting an aggregate optical radiation including a plurality of wavelengths (Lambdas 1-5),

j. a plurality selective optical couplers (51-54) distributed along said main propagation path, each said selective optical coupler being arranged for adding to and

removing from said aggregate optical radiation respective tributary optical radiation centered around a respective tributary wavelength, and

k. a plurality tributary propagation paths (uppermost right and lowermost left) for optical radiation provided in said integrated optics substrate, each of said tributary paths extending between a respective one of said selective optical couplers and respective tributary port for transmitting said tributary optical radiation centered around said respective tributary wavelength,

21. Saito fails to teach the optical multiplexer/demultiplexer wherein said main propagation path extends a zig-zag pattern including least one cusp, least one reflecting element being arranged said at least one cusp produce propagation of optical radiation along said zig-zag propagation pattern, said at least one reflecting element including a reflecting metallization associated with said integrated optics substrate.

22. Seino teaches a means for shortening conventional waveguide devices (Column 13, lines 13-23) by having a folded waveguide structure (Figures 19, 20 and 27) on a silicon substrate (Column 13, line 36 and Column 14, line 14) such that metallized (Column 12, lines 45-55) reflectors (16) are positioned on opposing sides of an integrated optics strip (7). The reflectors thereby make reflecting cusps for a zig-zag patterned optical device. Devices such as optical filters (14) for wavelength-multiplex communications (Column 1, line 30) can then be arranged in a zig-zag pattern to take up less space (Column 1, lines 46-50).

23. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the optical multiplexer/demultiplexer of Saito as taught by Seino so as to have a main propagation path extending in a zig-zag pattern, including least one cusp, and at

least one reflecting element being arranged at said at least one cusp to produce propagation of optical radiation along said zig-zag propagation pattern, said at least one reflecting element including a reflecting metallization associated with said integrated optics substrate in order to shorten (Seino, Column 13, lines 13-23) the device of Saito to take up less space (Seino, Column 1, lines 46-50).

24. Regarding claim 18, Saito teaches the optical multiplexer/demultiplexer of claim 17, wherein said integrated optics substrate includes optical waveguides defining said main propagation path for optical radiation, and wherein said optical couplers (51-58) are formed by said optical waveguides (Figure 16).

Conclusion

25. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Patent to Scifres (US 5,088,105) is of interest for teaching zig-zag waveguides altered by gratings, pump regions and electrical contact regions (Figures 2, 6 and 7). Application to Mathis (US 2002/0067881) is of interest for the teachings of Figure 2, which shows an optical multiplexer/demultiplexer with an additional filter point 22. Mathis teaches away from a compact reflecting system, as suggested by Seino, since the excellent isolation provided by the element 22 would be destroyed by the introduction of a reflection point (Paragraph 31).

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krystyna Suchecki whose telephone number is (571) 272-2495. The examiner can normally be reached on regular working days and hours.

27. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

28. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ks

EDWARD J. GLICK
SUPERVISORY PATENT EXAMINER